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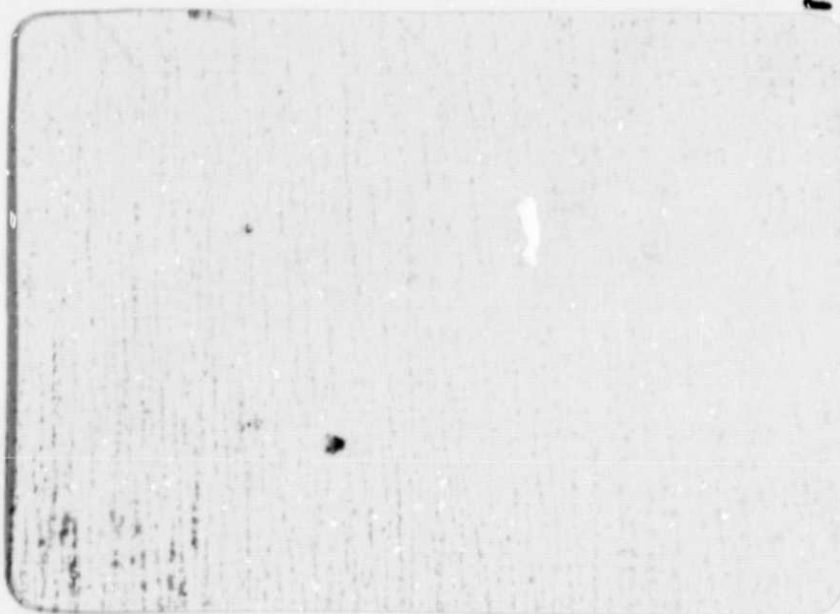


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Responsible author 		13. Authorized by <i>Nelson de Jesus Parida</i> Director General	
14. Abstract/Notes <p><i>This report presents the current status of the Brazilian LANDSAT facilities operated by CNPq/INPE and the results achieved during the period from October 01, 1983 to September 30, 1984.</i></p> <p><i>Original photography may be purchased from EROS Data Center Sioux Falls, SD 57198</i></p>			
15. Remarks <i>Prepared for the LGSOWG (Landsat Ground Station Operators Working Group) and LDDMWG (LGSOWG Data Distribution and Marketing Working Group) meetings of October/November, 1984 (São José dos Campos, Brazil).</i>			

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1. RECEIVING AND RECORDING

INPE's Receiving Station at Cuiabá, MT, operates normally the two tracking and receiving systems it has installed, the old one (1973) for Band S only and the new one (February 1983) for dual S- and X-band.

Both MSS and TM recording capabilities are functional. The old RBV recorder was transferred to the Processing Station at Cachoeira Paulista to be used in playback as a backup to the existing one.

Routine recordings are being made for Landsat-4 MSS over full acquisition range and (since April 6, 1984) Landsat-5 TM over the Brazilian territory. Therefore, INPE maintains an 8-day revisiting cycle, although with alternating instruments.

Limited Landsat-5 MSS recordings have been made over selected areas where special interest exists.

Due to the restrictions to the number of TM scenes transmitted to ground stations, as well as to the higher costs of recording and storing TM data, recording over other countries is planned to be subject of special arrangements between each interested country and Brazil, after accordance from NOAA.

From October 1983 to September 1984 the Station recorded:

- 630 MSS passes from Landsat-4
- 44 MSS passes from Landsat-5
- 273 TM passes from Landsat-5.

Support to the NASA Backup Plan for MSS data also remains active.

2. PROCESSING

2.1 - MSS SUBSYSTEM

The Electronic and Photographic Laboratories operated with some restrictions during the period of this report. The mean time between failures of the equipments is decreasing steadily due to age (more than 12 years for most machines). For example, our color production line was down during several months.

First generation film originals and CCTs were produced under user request only. Quicklook imagery kept being generated for the full acquisition, although with some weeks of delay.

On the other hand, the Precision production line became fully operational and is supporting several user cartographic applications under guidance of the Cartographic Applications Laboratory.

Development of a fully digital geometric correction and mosaicing system is well under way, taking advantage of two high-capacity disks that were incorporated into the PDP-11/34 support computer system. As a first byproduct, MSS Band Interleaved by Lines (BIL) CCTs are now being offered to the user community as an alternative to the traditional BIP2 format.

Up to September 30, Processing Labs processed:

- 474 full MSS passes in Quicklook form;
- 575 MSS scenes in high resolution 70mm film;
- 208 MSS CCTs for external use.

2.2 - RBV SUBSYSTEM

RBV processing was not resumed during the period of this report. The derivation of new shading-correction tables has had its priority lowered in face of more urgent tasks and the advent of the 30-meter resolution TM data. Since our line is fully analog and cannot profit from computer help, production of good quality RBV images will require extensive human work.

2.3 - TM SUBSYSTEM

In February, 1984 the final Acceptance tests for the TM Processing System were concluded at Cachoeira Paulista. The tests employed only Landsat-4 data from 2 HDDTs recorded and provided by NASA as an aid to integrate the system, once INPE had no direct-recording TM data by that time.

After the launch of Landsat-5 in March and start of TM transmissions to ground stations in April, several weeks of effort were dedicated, mainly in the software area, to adjust the embedded satellite/instrument parameters to the new characteristics and coefficients. Some of the data involved became available only at the LTWG meeting in June.

Partly as a result of that, production of user-deliverable high resolution TM imagery so far has not been voluminous. A considerable amount of time was also dedicated to establish compromise procedures and parameters for enhancing the brightness/contrast of most TM spectral bands on film to make them suitable to the wide variety of ground truths across Brazil. The management software also had to undergo several small corrections to appropriately handle Landsat 5 and mainly to migrate from a development environment to a real-life production situation where several operational requirements and constraints have to be taken into account.

After a steady state was reached, Quicklook images were systematically generated for all acquired passes within at most two weeks after reception.

Up to September 30, the Processing Labs processed (considering only user-deliverable items):

- 262 full TM passes in Quicklook form;
- 89 TM scenes in high resolution 5" film.

TM CCTs not been requested up to this moment. Besides their considerably higher cost, the Brazilian user community has been traditionally more oriented towards photographic products, and it is expected that, after users get more acquainted with TM data, digital products begin to be requested. INPE itself is still adapting existing application software to profit from TM CCTs. Foreign users probably would have requested CCTs if data over other countries were available.

At present, effort is being dedicated to ultimate the software modifications needed to release photographic Quadrant products to users. They have been asking for these products, despite their not being in the first Price List, mainly due to interest in large (> 1:250,000) scales.

2.4 - SPECIAL PRODUCTS

Although not intended for short term inclusion in the list of user-deliverable products, some custom processing software has been developed for limited applications. An enhanced TM image of Brasilia, color composited with bands 2, 4 and 7 is shown as an example in Annex A. The photographic original scale was 1:500,000.

3. DISTRIBUTION

From October 1983 to September 1984 INPE distributed a total of 3585 Landsat products, 3377 of them as photographic frames and 208 as digital products (CCTs). Quarterly summaries covering that period and showing also the user distribution profile, are included in Annex B, along with historical data concerning acquisition, processing and dissemination of Landsat data.

The MSS/RBV products Price List was updated on May 1984 with the inclusion of MSS Quicklook products and BIL CCTs. Prices for the existing products were not changed, except for the high-contrast options. A new Price List will be effective November 1st, 1984, with the sole changes of a further reduction in the price of high-contrast products and the removal of 800 bpi BIL CCTs.

The first TM products Price List was published in July 1983 as a preliminary one. A new Price list will follow starting on November 01, including photographic Quadrant products, which are expected to be available after January 1985. Prices for the existing products were maintained, since too little volume was distributed up to the present to allow a better estimate of the involved production costs.

The new Landsat Price Lists for MSS/RBV and for TM products are enclosed as Annex C.

A revised Landsat-4/-5 coverage map was prepared and has been distributed to users (see Annex D). At this moment we register 1477 Landsat data users, 242 of them from foreign countries.

The Order and Production Management system has been extended to handle TM products through the Photolab and down to final shipping. The TM software delivered with the processing system managed just the first generation production steps. What remains to

be done is the integration of the order handling with the Accounting and the User index. However, this will require a major software effort and there is no precise forecast of when the task will be addressed.

ANNEX A

ENHANCED TM IMAGE OF

BRASILIA



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ANNEX B

DATA ACQUISITION, PROCESSING AND

DISTRIBUTION SUMMARIES

- B.1 Scenes Received, Recorded and Processed
1973-1984
- B.2 Images Distributed to Users 1973-1984
- B.3 CCTs Produced to Users 1973-1984
- B.4 Images and CCTs - quantity and revenue
1973-1984
- B.5 Quarterly Sales/Distribution Summaries
October, 1983 to September, 1984

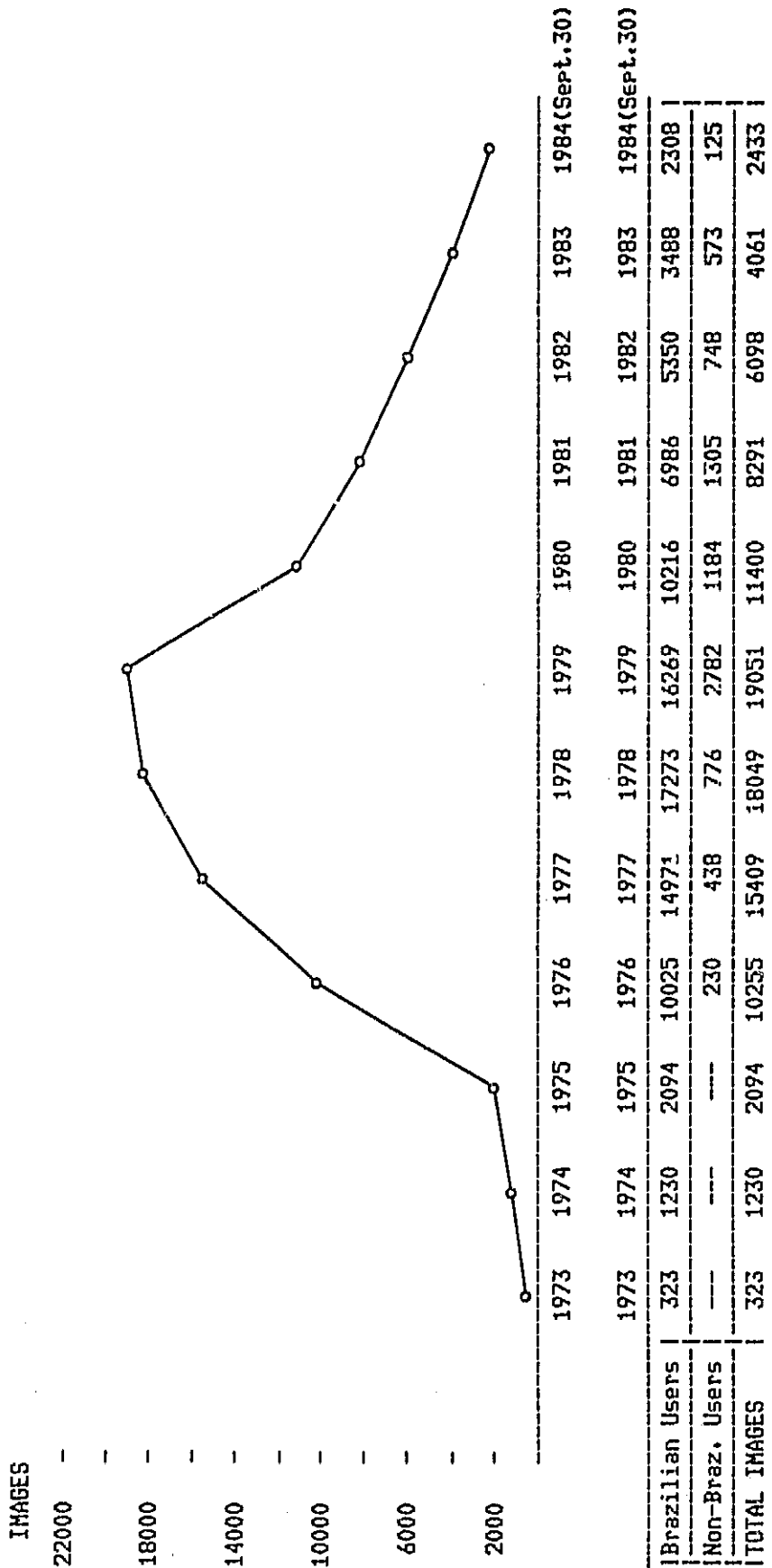
BRAZIL
CNPq/INPE - LANDSAT SYSTEM

Scenes Received and Recorded
and
Scenes Converted to Images
(Accumulated figures)

		1973 (May)	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984 (Sept. 30)
RECEIVED	SATELLITES												
	MSS	6114	14674	23112	32528	=>	=>	=>	=>	=>	=>	=>	=>
	LANDSAT 1 RBV												
	MSS			1550	3370	19632	23952	32532	38626	51958	52948	=>	=>
	LANDSAT 2 RBV					288	=>	=>	=>	=>	=>	=>	=>
RECORDED	MSS						11487	17364	25768	=>	29869	=>	=>
	LANDSAT 3 RBV						1579	9477	23161	37329	43155	45201	=>
	MSS										4383	18199	28341
	LANDSAT 4 TH												
	MSS												968
P R O C .	LANDSAT 5 TH												4914
	MSS	6114	14674	24662	35898	52160	67967	82424	96922	110254	119728	133544	144654
	RECV					288	1867	9765	23449	37617	43443	45489	45489
	TH												4914
	TOTAL			2232	5581	11162	19722	25281	27136	35364	40591	42309	43508
								802	3470	9410	9497	9531	89

LGSONG MEETING
OCT 84

BRAZIL
CNPq/INPE - LANDSAT SYSTEM
Images Distributed to Users



LGSONG MEETING
OCT 84

BRAZIL
CNPq/INPE - LANDSAT SYSTEM

CCTs Produced to Users

CCTs

250
-
200
-
150
-
100
-
50
-
-



1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984(Sept.30)

1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984(Sept.30)

Brazilian Users	---	10	55	120	95	105	107	99	103	78	131	115
Non-Braz. Users	---	---	---	21	37	36	39	77	81	47	57	24
TOTAL CCTs	---	10	55	141	132	141	146	176	184	125	188	139

LGSOWS MEETING
OCT 84

BRAZIL

CNPq/INPE - LANDSAT SYSTEM

Images and CCTs Distributed

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984 (Sept. 30)
Q Images	323	1230	2094	10255	15409	18049	19051	11400	8291	6098	4061	2433
Y CCTs	--	10	55	141	132	141	146	176	184	125	188	139
R Images	---	4808	26020	57695	118457	232661	251367	338356	291492	484508	263396	110721
V CCTs	---	---	---	4200	7400	7200	20853	39345	52019	64425	77557	53981
U TOTAL	---	---	---	---	---	---	---	---	---	---	---	---
E US\$	---	4808	26020	61895	125857	239861	272220	377901	343511	548933	340953	164702

LGSOWG MEETING
OCT 84

CNPQ/INPE

LANDSAT PRODUCT SALES/DISTRIBUTION SUMMARY
FOR THE 4TH QUARTER (OCT-DEC) 1983

1 - Total number of LANDSAT images by frames sold or distributed to users and monetary value US\$

1.A - All satellites and instruments:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	967	277	69	
US\$	57,687.00	14,966.00	33,593.00	106,246.00

1.B - LANDSAT-4 MSS only:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	287	39	7	
US\$	23,370.00	3,022.00	2,977.00	29,369.00

2. Classification of sales and distribution of phototographic products and CCTs by type of user

USER TYPE	PHOTO PRODUCTS		CCTs	
	% by money	% by frames	% by money	% by frames
A. National Government	61.81	53.79	19.60	31.98
B. State/Provincial Govt	1.10	0.88	1.06	1.45
C. Academic	-	-	1.57	2.90
D. Industry	21.00	26.60	1.74	2.90
E. Individuals	2.33	2.49	-	-
F. Outside the country	13.76	16.24	76.03	60.87
TOTAL	100.00%	100.00%	100.00%	100.00%

CNPQ/INPE

LANDSAT PRODUCT SALES/DISTRIBUTION SUMMARY
FOR THE 1ST QUARTER (JAN-MAR) 1984

1 - Total number of LANDSAT images by frames sold or distributed to users and monetary value US\$

1.A - All satellites and instruments:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	499	36	35	
US\$	22,407.00	1,821.00	9,334.00	33,562.00

1.B - LANDSAT-4 MSS only:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	126	4	10	
US\$	6,933.00	241.00	2,650.00	9,824.00

2. Classification of sales and distribution of photographic products and CCTs by type of user

USER TYPE	PHOTO PRODUCTS		CCTs	
	% by money	% by frames	% by money	% by frames
A. National Government	47.92	53.64	24.55	31.43
B. State/Provincial Govt	7.78	4.30	-	-
C. Academic	11.12	13.09	8.89	8.57
D. Industry	22.54	21.87	53.60	54.29
E. Individuals	1.27	1.12	-	-
F. Outside the country	9.37	5.98	12.96	5.71
TOTAL	100.00%	100.00%	100.00%	100.00%

CNPQ/INPE

LANDSAT PRODUCT SALES/DISTRIBUTION SUMMARY
FOR THE 2ND QUARTER (APR-JUN) 1984

1 - Total number of LANDSAT images by frames sold or distributed to users and monetary value US\$

1.A - All satellites and instruments:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	644	270	53	
US\$	35,117.00	13,615.00	20,003.00	68,735.00

1.B - LANDSAT-4 MSS only:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	231	29	14	
US\$	16,426.00	1,414.00	8,252.00	26,092.00

2. Classification of sales and distribution of photographic products and CCTs by type of user

USER TYPE	PHOTO PRODUCTS		CCTs	
	% by money	% by frames	% by money	% by frames
A. National Government	89.40	91.23	66.77	78.61
B. State/Provincial Govt	0.92	1.13	-	-
C. Academic	0.20	0.34	0.78	1.26
D. Industry	5.21	4.27	1.20	1.89
E. Individuals	0.54	0.44	-	-
F. Outside the country	3.73	2.59	31.25	18.24
TOTAL	100.00%	100.00%	100.00%	100.00%

CNPQ/INPE

LANDSAT PRODUCT SALES/DISTRIBUTION SUMMARY
FOR THE 3RD QUARTER (JUL-SET) 1984

1 - Total number of LANDSAT images by frames sold or distributed to users and monetary value US\$

1.A - All satellites and instruments:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	767	217	51	
US\$	35,413.00	2,348.00	24,644.00	62,405.00

1.B - LANDSAT-4 MSS only:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	271	39	9	
US\$	20,985.00	1,521.00	15,923.00	38,429.00

1.C - LANDSAT-5 TM only:

	FRAMES		SCENES ON CCT	TOTAL
	B & W	COLOR		
QUANTITY	12	-	-	
US\$	1,238.00	-	-	1,238.00

2. Classification of sales and distribution of Photographic products and CCTs by type of user

USER TYPE	PHOTO PRODUCTS		CCTs	
	% by money	% by frames	% by money	% by frames
A. National Government	73.79	84.40	67.01	73.20
B. State/Provincial Govt	0.44	0.34	-	-
C. Academic	2.46	1.54	0.63	1.31
D. Industry	11.17	6.31	1.15	1.31
E. Individuals	0.37	0.31	-	-
F. Outside the country	11.77	7.10	31.21	24.18
TOTAL	100.00%	100.00%	100.00%	100.00%

ANNEX C

LANDSAT PRODUCTS PRICE LISTS

STARTING NOVEMBER 1st, 1984

C.1 MSS/RBV Products

C.2 TM Products



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PRICE LIST -- NOVEMBER 01, 1984 TO APRIL 30, 1985

LANDSAT DATA -- MSS & RBV

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ATTENTION! Add US\$ 5.00 for each photographic product and US\$ 65.00 for each digital product involving MSS images from Landsats 4 or 5 (distribution fee paid to NOAA-USA),

=====

PHOTOGRAPHIC PRODUCTS

A) Quick-Look products (MSS only; uncorrected/low resolution images meant for cloud cover and quality evaluation; available in just one spectral band; generally Band 5; scale and size approximate)

Scale	Medium	Sensor	Size	Code	Price(US\$)
1:3,704,000	Paper	MSS	50mm	1 36	3.00
1:1,000,000	Paper	MSS	185mm	2 36	10.00

B) Bulk products (System-corrected geometrically and radiometrically; Sun elevation-compensated)

B.1) Black-and-white

Scale	Medium	Sensor	Size	Code	Price(US\$)
1:3,704,000	Film negative	MSS	50mm	1 26	53.00
1:3,704,000	Film positive	MSS	50mm	1 25	44.00
1:1,980,000	Film negative	RBV	50mm	0 40	53.00
1:1,980,000	Film positive	RBV	50mm	0 39	44.00
1:1,000,000	Film positive	MSS	185mm	2 25	89.00
1:1,000,000	Paper	MSS	185mm	2 27	53.00
1:500,000	Film positive	RBV	198mm	3 39	89.00
1:500,000	Paper	RBV	198mm	3 41	53.00
1:500,000	Paper	MSS	370mm	3 27	116.00
1:250,000	Paper	RBV	396mm	4 41	116.00
1:250,000	Paper	MSS	740mm	4 27	228.00
1:100,000(*)	Paper	RBV	990mm	5 41	250.00

B.2) Color (MSS only; normal band usage 4/5/7)

Scale	Medium	Sensor	Size	Code	Price(US\$)
1:1,000,000	Film positive	MSS	185mm	2 28	113.00
1:1,000,000	Paper	MSS	185mm	2 29	89.00
1:500,000	Paper	MSS	370mm	3 29	149.00

Special High Contrast processing (recommended for the Amazonian Region) available for any MSS bulk product above; flag it on your request if desired. Additional fee -- US\$ 50.00 per image.

(*) distribution controlled by Brazilian EMFA (Armed Forces Ministry) based on present law regulations.

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 CUIABÁ-MT - MONTE DA CONCEIÇÃO S/N - CX. POSTAL 714 - FONE (065) 321-9514 - TELEFAX (065) 21114 - CEP 78.000
 NATAL-RN - AV. BALDADO FILHO Nº 1000 - CX. POSTAL 130 - FONE (085) 231-4733 - TELEFAX (084) 21103 - CEP 69.000
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 FORTALEZA-CE - DISTRITO DE CUIZINHO - FONE (085) 234-4984 - TELEFAX (011) 34061 - CEP 01235

DIGITAL PRODUCTS (MSS only; system-corrected Just radiometrically;
----- bands 4, 5, 6 and 7)

A) BIP2 (Band Interleaved by Pixel Pairs) CCTs in the traditional
format

Density	Tapes	Image organization	Code	Price(US\$)
800 bpi	2x2400'	eight 432-pixel-wide strips	35	605.00
1600 bpi	2x2400'	eight 432-pixel-wide strips	34	605.00

B) BIL (Band Interleaved by Lines) CCTs following the international
format standards

Density	Tapes	Image organization	Code	Price(US\$)
1600 bpi	1x2400'	single 3240-pixel-wide strip	32	675.00


=====

NOTES: 1) Payments must be made in advance through a nominal check
----- to Instituto de Pesquisas Espaciais. An account can also
be maintained for quickest servicing.

2) Prices include airmail delivery for photographic prod-
ucts; CCTs are normally airfreighted collect.

3) Normal servicing time is 10-15 days; CCTs can suffer an
additional 10 days delay to obtain the necessary export
license.

October 1984


Nelson de Jesus Parada
Director General



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PRICE LIST -- NOVEMBER 01, 1984 TO APRIL 30, 1985

LANDSAT DATA -- THEMATIC MAPPER (TM)

ATTENTION: Prices include the NOAA distribution fee of US\$25.00 for each photographic product and US\$ 300.00 for each complete scene in digital form. This fee does not apply to Quick-look Products.

PHOTOGRAPHIC PRODUCTS

A) Quick-Look Products (uncorrected/low resolution images meant for cloud cover and quality evaluation; available in just one spectral band; generally Band 3; full frame only; scale and size approximate)

Scale	Medium	Size	Code	Price(US\$)
1:4,000,000	Paper	40mm	0020	3.00

B) Bulk Products (System-corrected geometrically and radiometrically; Sun elevation-compensated)

Obs.: FF = full frame; QD = quadrant (*)

B.1) Black-and-white

FF/QD	Scale	Medium	Size	Code	Price(US\$)
FF	1:1,000,000	Film negative	185mm	0302	110.00
FF	1:1,000,000	Film positive	185mm	0312	100.00
FF	1:1,000,000	Paper	185mm	0322	75.00
FF	1:500,000	Paper	370mm	0323	140.00
FF	1:250,000	Paper	740mm	0324	250.00
QD	1:500,000	Film negative	185mm	4302	135.00
QD	1:500,000	Film positive	185mm	4312	125.00
QD	1:500,000	Paper	185mm	4322	100.00
QD	1:250,000	Paper	370mm	4323	165.00
QD	1:125,000	Paper	740mm	4324	275.00

B.2) Color (normal band usage 2/3/4 for false color and 1/2/3 for true color)

FF/QD	Scale	Medium	Size	Code	Price(US\$)
FF	1:1,000,000	Film positive	185mm	1312	200.00
FF	1:1,000,000	Paper	185mm	1322	180.00
FF	1:500,000	Paper	370mm	1323	240.00
QD	1:500,000	Film positive	185mm	5312	225.00
QD	1:500,000	Paper	185mm	5322	205.00
QD	1:250,000	Paper	370mm	5323	265.00

Additional fee for band combinations different from the above (master color negative retained): US\$100.00.

(*) Quadrant products available starting January 1985.

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CUIABÁ-MT - MONJO DA CONCEIÇÃO 3/4 - CX. POSTAL 714 - FONE (066) 321-9314 - TELEX (0652) 114 - CEP 78.000
NATAL-RN - AV. SALGADO FILHO Nº 1000 - CX. POSTAL 130 - FONE (084) 231-4733 - TELEX (0842) 185 - CEP 58.000
FORTALEZA-CE - DISTRITO DE EUSEBIO - CX. POSTAL 1261 - FONE (085) 224-4966 - CEP 60.000

DIGITAL PRODUCTS (system-corrected radiometrically; geometric corrections not applied, except for those relative to the along-line scanning mirror movement, which are applied through nearest-neighbor resampling.)

A) Full frame (n = number of bands, from 1 to 7; '*' = 'times')

Format	Density	Tapes	Code	Price (US\$)
RIL	1600 bpi	n*2400'	241n	100.00 + n * 550.00
BSQ	1600 bpi	n*2400'	243n	100.00 + n * 550.00

B) Quadrant (all 7 bands or just 3 in any combination)

Bands	Format	Density	Tapes	Code	Price (US\$)
3	RIL	1600 bpi	1*2400'	6413	600.00
3	BSQ	1600 bpi	1*2400'	6433	600.00
7	RIL	1600 bpi	2*2400'	6417	1300.00
7	BSQ	1600 bpi	3*2400'	6437	1340.00

- NOTES: 1) Payments must be made in advance through a nominal check to Instituto de Pesquisas Especiais. An account can also be maintained for quickest servicing.
- 2) Prices include airmail delivery for photographic products; CCTs are normally airfreighted collect.
- 3) Normal servicing time is 15-20 days; CCTs can suffer an additional 10 days delay to obtain the necessary export license.

October 1984

Nelson de Jesus Parada
Nelson de Jesus Parada
Director General

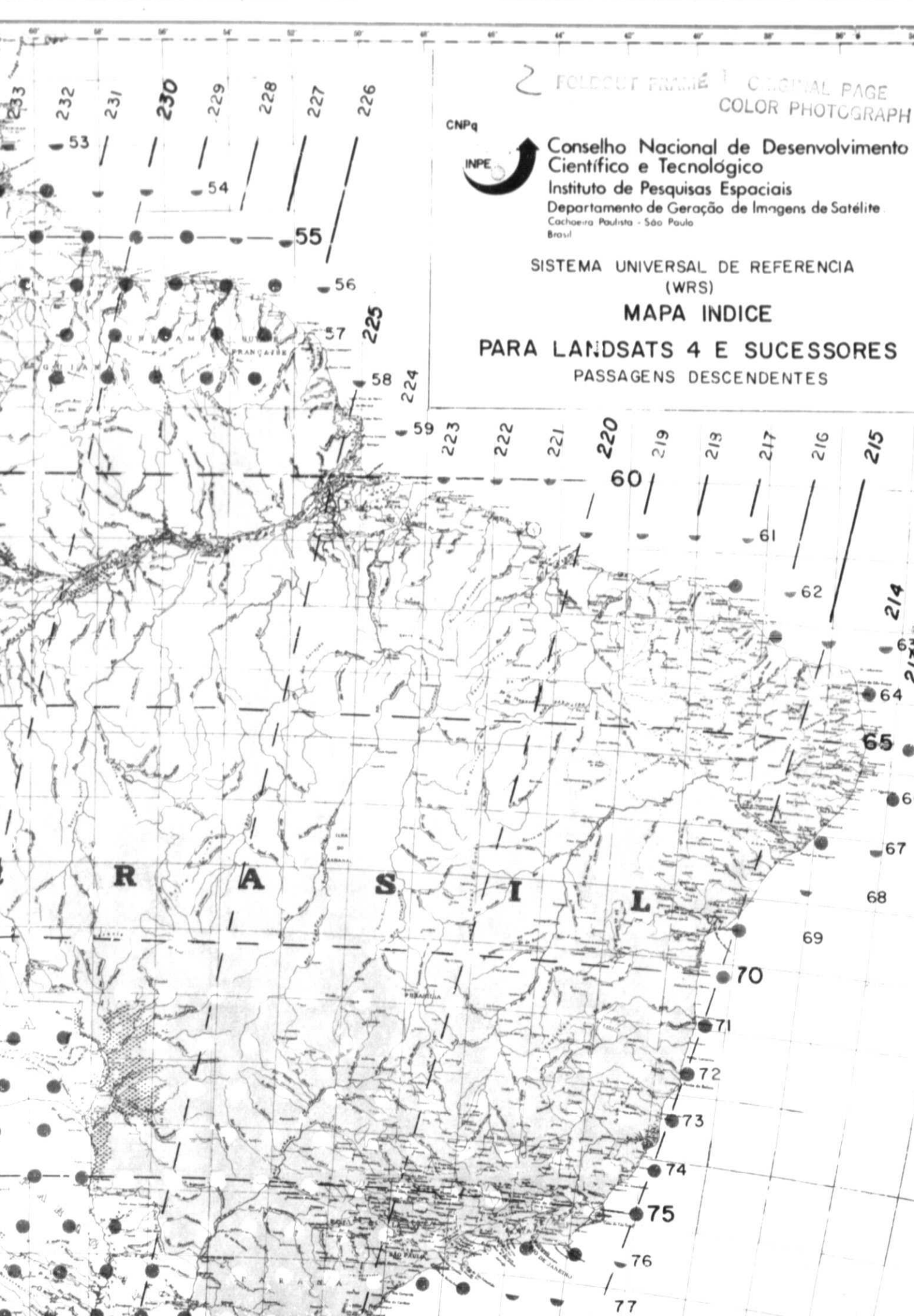
ANNEX D

REVISED LANDSAT-4/-5 COVERAGE MAP

ORIGINAL PAGE 72
COLOR PHOTOGRAPH

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B R



2 FOLDED PAGE 1 ORIGINAL PAGE
COLOR PHOTOGRAPH

CNPq

INPE

Conselho Nacional de Desenvolvimento
Científico e Tecnológico
Instituto de Pesquisas Espaciais
Departamento de Geração de Imagens de Satélite
Cachoeira Paulista - São Paulo
Brasil

SISTEMA UNIVERSAL DE REFERENCIA
(WRS)

MAPA INDICE

PARA LANDSATS 4 E SUCESSORES
PASSAGENS DESCENDENTES

ORIGINAL PAGE 72
COLOR PHOTOGRAPH

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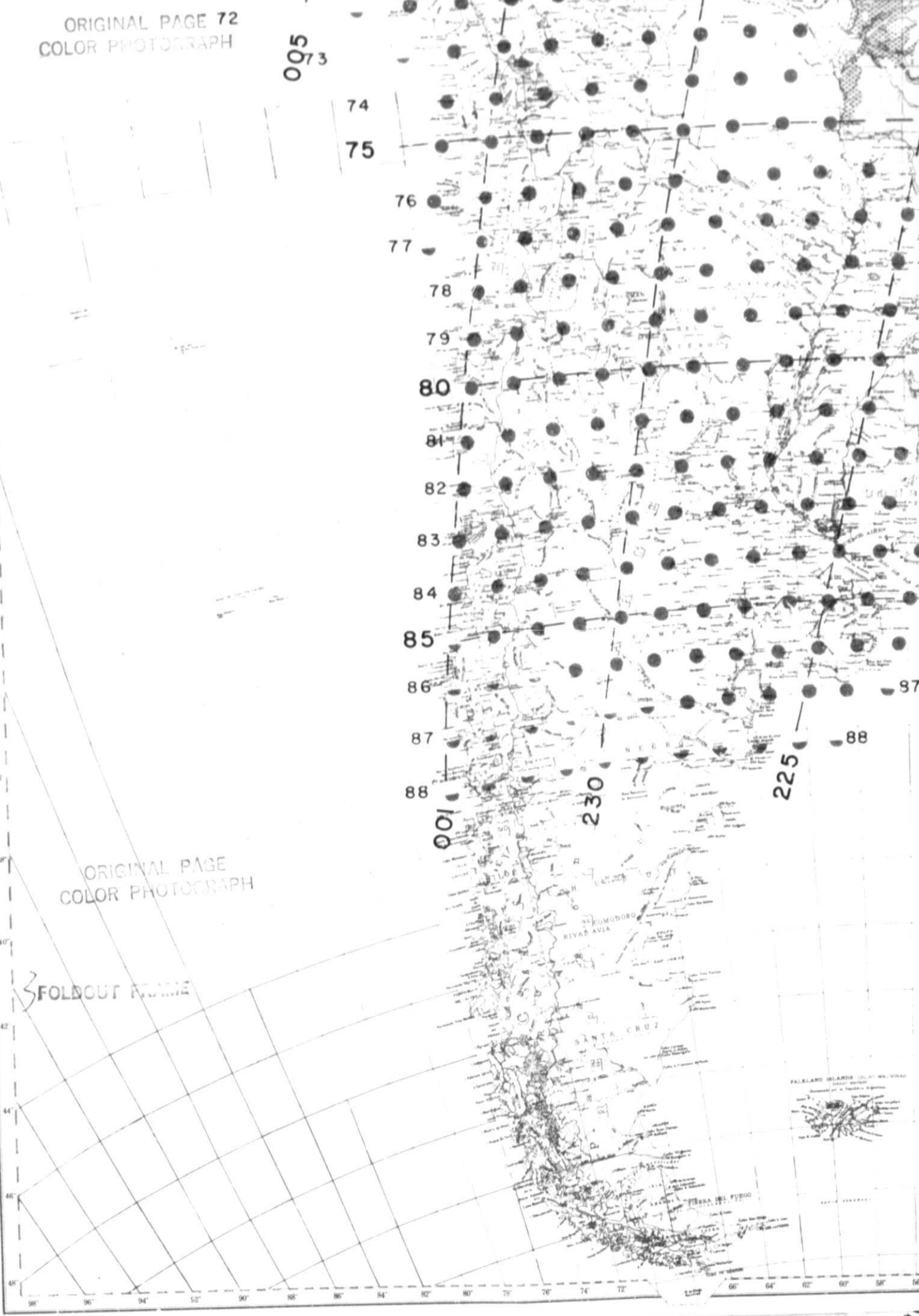
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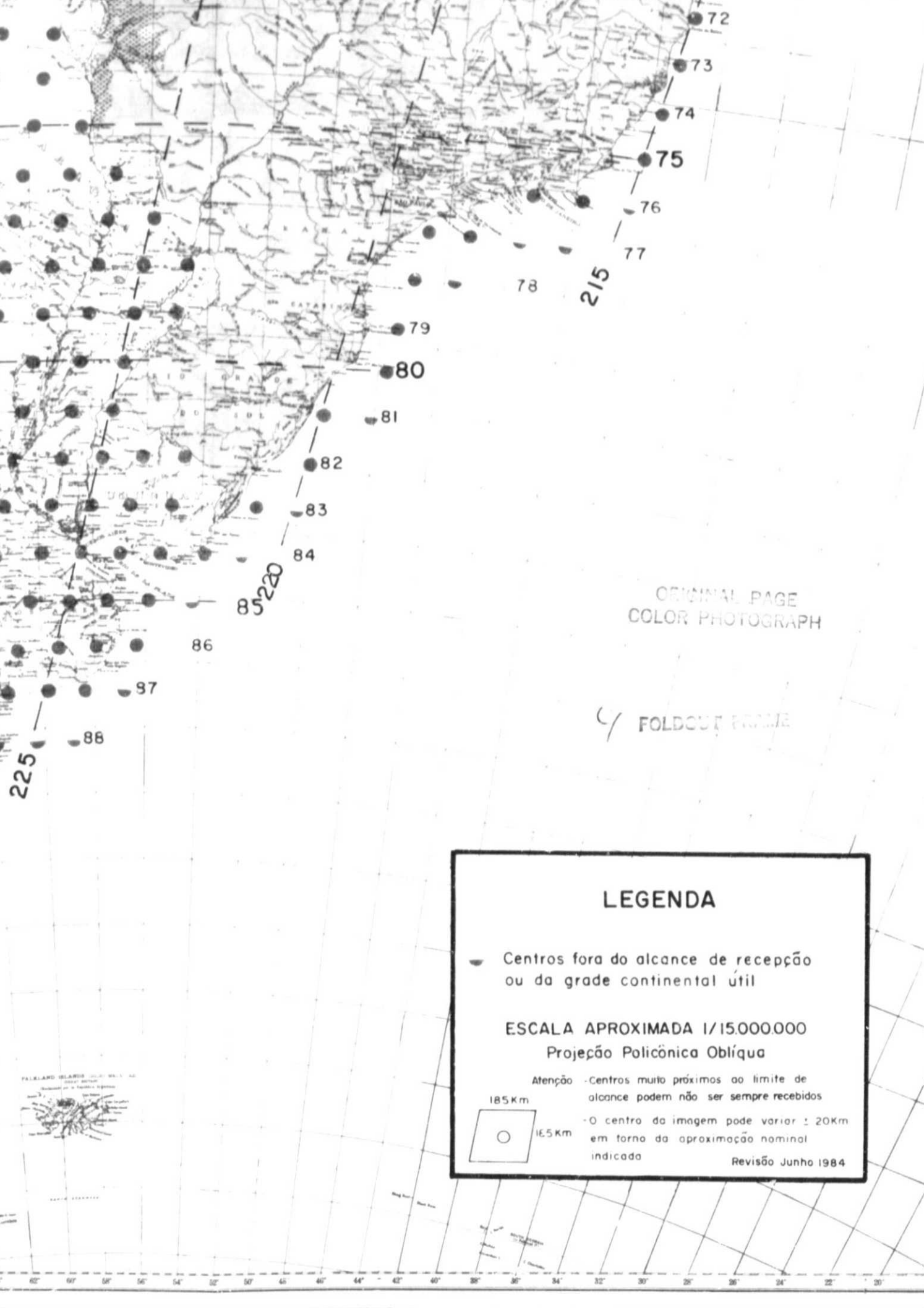
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ORIGINAL PAGE
COLOR PHOTOGRAPH

FOLDOUT PLANE





ORIGINAL PAGE
COLOR PHOTOGRAPH

FOLDOUT FRAME

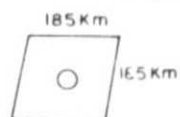
LEGENDA

Centros fora do alcance de recepção
ou da grade continental útil

ESCALA APROXIMADA 1/15.000.000

Projeção Policônica Oblíqua

Atenção -Centros muito próximos ao limite de
alcance podem não ser sempre recebidos



-O centro da imagem pode variar $\pm 20\text{Km}$
em torno da aproximação nominal
indicada

Revisão Junho 1984